

MDOT White Paper: Speed Reductions on 75 mph Posted Freeways

Issue:

In 2017, 600 miles of Michigan Department of Transportation (MDOT) state freeways were changed from 70 mph to 75 mph. Public Act 445 of 2016 tasked MDOT and the Michigan State Police (MSP) with increasing speed limits on freeways in accordance with the 85th percentile speeds (the speed at or below which 85 percent of traffic is moving). This 5 mph increase introduced a change to the way MDOT reduces speeds in construction work zones.

The total reduction of 15 mph from 75 mph to 60 mph would create one of two signed scenarios:

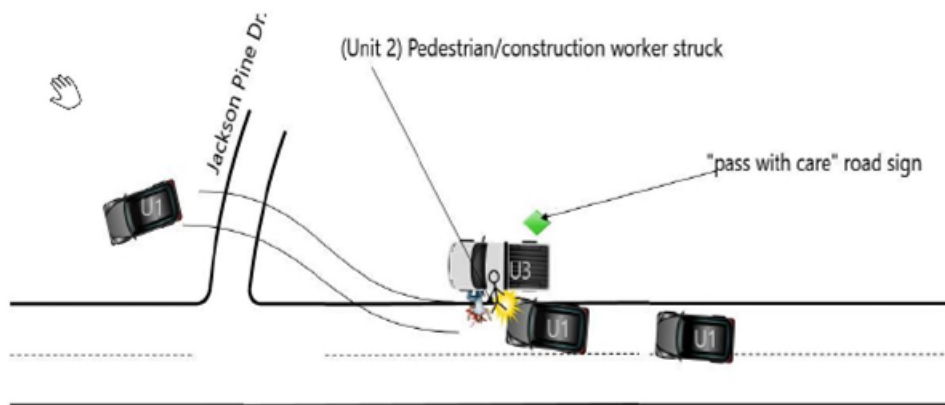
- 75 mph to 70 mph to 60 mph: Signage necessary to accomplish this reduction creates a longer work zone with more sign set-ups. Furnishing, operating and maintaining these signs increases worker exposure. This scenario is the current written practice as stated in Work Zone Safety Mobility Manual (WZSMM) and Manual on Uniform Traffic Control Devices (MMUTCD).
- 75 mph to 60 mph: Signage necessary to accomplish this reduction may violate current guidance in WZSMM and MMUTCD but creates shorter work zones with less worker exposure and is the current signed practice in the field.

Data:

In response to a sweeping change to safety culture, MDOT has elected to look at signing practices in the hopes to reduce unnecessary worker exposure. Lead-in signs, such as the W3-5b signs, are not shielded with positive protection devices such as concrete barrier wall and, as a result, the risk to workers (both internal and external) is high.

An example of driver distraction and the detriment to workers is included in Appendix A, documented on a State of Michigan Traffic Crash Report. This crash report documents a worker who was performing work on a sign being struck by a distracted driver (Figure 1).

Figure 1
Diagram from Worker Struck Crash Report



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MDOT is currently not providing consistent signing for 75 mph speed reductions based on Work Zone Safety Audit information. It is estimated that up to 30 percent of all projects that drop from 75 mph to 60 mph do so in steps incongruent with guidance in WZSMM. WZSMM calls for speed reductions from 75 mph to 70 mph to 60 mph, and work zone reviews are showing the use of 65 mph signs in some scenarios to reduce speeds on 75 mph freeways (see Figure 2).

Figure 2
Use of 65 mph Signs to Reduce Speeds



An inquiry was sent via Federal Highway Administration List Serve to the Midwest Roundtable groups as well as other state departments of transportation to inquire as to their state policies. The following questions were posed:

- For states that have roadways with existing speed limits of 75mph or higher, how does your state sign for the drop in speed limit for work zones? Do you drop in 10mph increments? 5 mph increments?
- Do you allow a 15 mph increment drop? For example: 75 mph to 60 mph? 75 mph to 70 mph to 60 mph? 75 mph to 65 mph to 55 mph? Other?
- If you have 45mph Where Workers Present signage, do you sign your work zones for 60mph then drop to 45 WWP?

MDOT received the responses shown in Table 1.

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TABLE 1

STATE	EXISTING SPEED	SPEED REDUCTION	45 WWP	COMMENTS
North Carolina	70mph	Up to 15mph		Have variable speed limits. Speed limits approved by State Traffic Engineer.
Virginia	70mph	10mph	No	
North Dakota		up to 30mph		NDDOT does not have a speed reduction policy but typically drop in 2 stages
California	70mph	10mph		They drop 70/60/55. They would drop the 10mph first then 5mph last
New Mexico	75mph	10mph		75/65/55
Wyoming	80mph	15mph/20mph		Freeways 80/65/45 Highways 70/65/45 or 70/45
Montana	80mph	up to 30mph		Use two advance 3-5 signs when reducing 30mph
Arizona	75mph	10mph		Rarely reduce speed below 55mph
South Carolina	70mph	10mph	No	Speed limit is rarely reduced. Can go to a hard 45mph directly with a W3-5 sign
CalTrans	70mph	10mph		Step down on highways from 70mph to 60mph to 55mph. Use W3-5
Idaho	80mph	15mph	No	80/65 or 80/70/65 (either or)
Kansas		15mph		Allow 2 drops of up to 15mph per drop for a total of 30mph
Indiana	70mph	15mph	Yes	<p>In Indiana, the maximum decrement allowed for a speed limit reduction with a single step is 15 MPH. For steps greater than 10 MPH, a Reduced Speed Limit Ahead warning sign is also required. Indiana also has a law that allows Worksite Speed Limits to be established without requiring an Official Action. When speed limits are set via said law, it imposes a minimum Speed Limit reduction (decrement) of 10 MPH. However, reductions (decrements) of 5 MPH are still possible via the Official Action process, but this is rarely done. Basically, this means that in Indiana, single step decrements of 5 MPH, 10 MPH and 15 MPH are possible.</p> <p>So, for interstates with a speed limit of 70 MPH and a desired work zone speed limit of 45 MPH, this can be accomplished as follows:</p> <p>where SL = Speed Limit Sign in MPH and RSLA = Reduced Speed Limit Ahead Warning Sign</p> <ul style="list-style-type: none"> •SL 70 --> RSLA --> SL 55 --> SL 45 •SL 70 --> SL 60 --> RSLA --> SL 45 (This case is particularly useful where a long work zone might have a continuous speed limit reduction and further intermittent reduction when and where workers are present as the RSLA provides an additional warning prior to workers.) <p>Both of the above arrangements are commonly used in Indiana and both are used when workers are present.</p> <p>For interstates with a speed limit of 70 MPH and a desired work zone speed limit of 55 MPH, in Indiana this is typically</p>
Washington State	75mph/70mph	Up to 15mph		
New Jersey	70mph	10mph		

Table 1 – State responses to Survey on Speed Reductions. Fifteen states responded to the survey on speed reductions, with more than half stating they reduce speeds in increments greater than 10 mph (highlighted in green). Many states made use of W3-5 signs in advance of the speed reduction to provide appropriate motorist warning.

Allowing a reduction of 15 mph would align MDOT practices with more than half of the states that responded. MDOT currently utilizes the W3-5b sign in our Construction Typical's lead-in signing. Based on the information shared from other states, we would propose the use of the W3-5 sign (Figure 4) in place of the W3-5b sign (Figure 3) to better communicate anticipated speeds to motorists and to align with the requests stated in MMUTCD for these 75 mph-to-60 mph reductions in speed only.

Figure 3 –
W3-5b Sign to be replaced.



Figure 4 –
W3-5 Sign to be used in place of W3-5b sign.



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Documentation:

Michigan Vehicle Code Section 257.627 (9) states:

A person operating a vehicle on a highway, when entering and passing through a work zone described in section 79d(a) where a normal lane or part of the lane of traffic has been closed due to highway construction, maintenance or surveying activities, shall not exceed a speed of 45 miles per hour unless a different speed limit is determined for that work zone by the state transportation department, a county road commission, or a local authority, based on accepted engineering practice.

MMUTCD section 6C.01 states that:

... A reduction of more than 10 mph in the speed limit should be used only when required by restrictive features in the TTC zone. Where restrictive features justify a speed reduction of more than 10 mph, additional driver notification should be provided...

MMUTCD Part 2C.38 also states:

A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign (see Figure 2C-7) should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

The MMUTCD sections quoted above give the impression that a drop of greater than 10 mph is both a practice to be avoided and a practice that can be considered and signed for. It is understood by this focus group that the 10 mph reduction discussed in Part 6 above was intended for advisory speed limits for roadway geometry features, such as curves, and not intended to set the course of speed reductions along freeways without restrictive geometric features.

This White Paper hopes to establish that the contents and decisions within are acceptable engineering practice and to reduce the instances of worker exposure by elimination of sign installations and removals. It will also establish that a 15 mph speed limit decrement is required for trunkline work zone routes posted as 75 mph in order to alleviate worker exposure and allow for the reduction of sign clutter.

Conclusion:

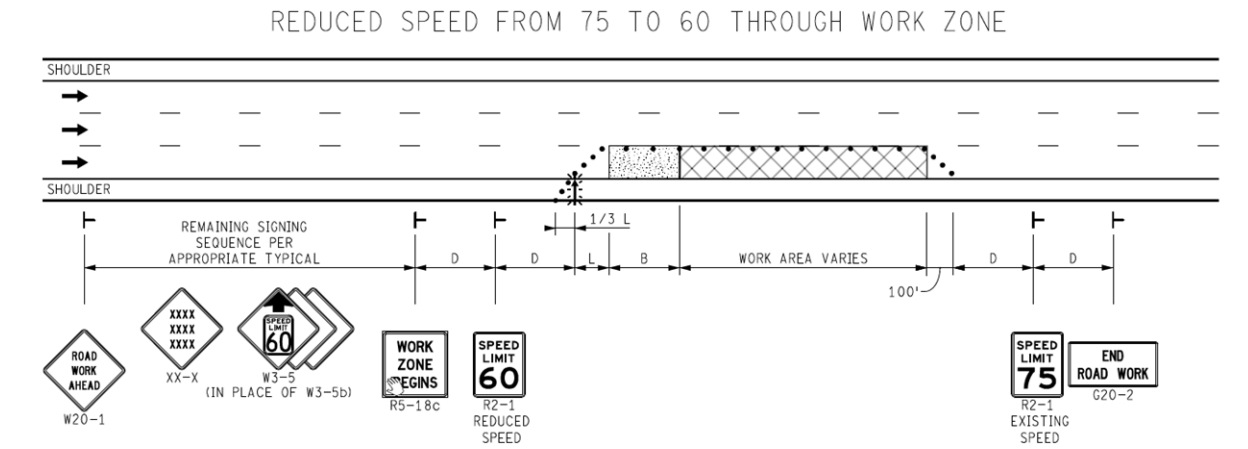
To better protect the workers in our industry, it is proposed that construction signage shall be permitted to drop from 75 mph to 60 mph without an intermediary 70 mph sign. MDOT guidance on these issues is documented below and will either need to be updated, rescinded or have content added to the WZSMM:

- WZSMM Chapter 6.03 and Appendix Examples
- System Operations Advisories 2017-003 and 2010-08
- Creation of work zone typical showing a 75 mph-to-60 mph speed reduction. Maintaining Traffic Typical Tables for D distance already include a D distance of 750 feet for a 75 mph-to-60 mph reduction (Excerpt of Draft shown in Figure 5, Typical shown in Appendix B).

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Figure 5

Draft Typical added to 107-GEN-SPEED Speed Limit Layout Typical.



Should the contents of this document be found acceptable to MDOT management and our policy changed, it is the intention of this group of authors, listed below, to study the effects of this practice over time by evaluating instances of worker hits and crashes. Results of this speed reduction practice may shape future suggested revisions to policy for non-freeway work zone signing as well.

Chuck Bergmann, Construction Field Services - Work Zone Technician

Krista Phillips, North Region - Traffic, Safety and Operations Engineer

Justin Junttila, Superior Region - Traffic and Safety Engineer

Lindsey Renner, Construction Field Services - Field Operations Engineer

Jacob VanZalen, Construction Field Services - Work Zone Engineer

Derek Weichlein, Mount Pleasant TSC - Traffic and Safety Engineer

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APPENDIX A

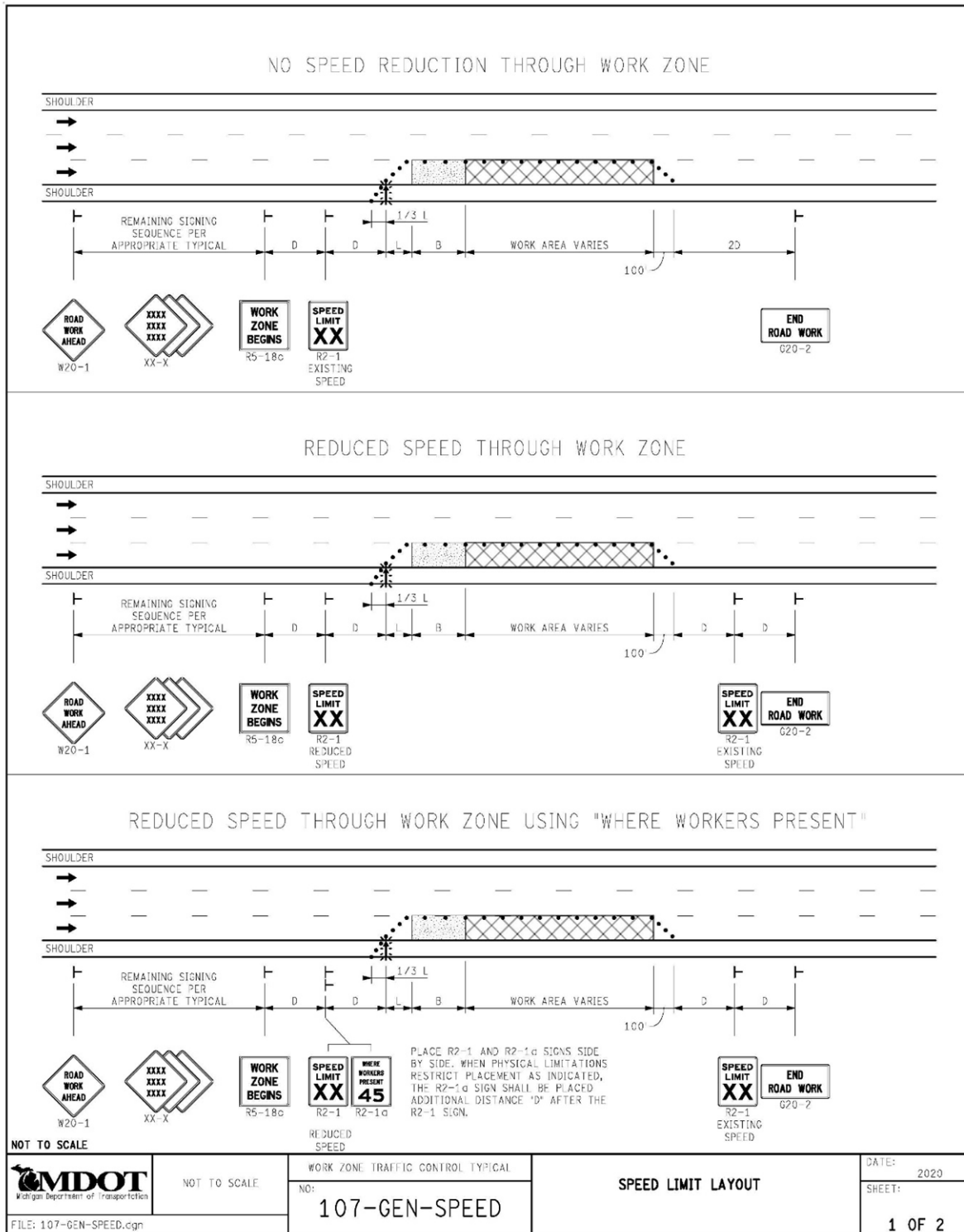
Authority: 1949 PA 300, Sec 257 622 Compliance Required MSP UD-10E Penalty: \$100 and/or 90 days (Rev 01/2016)		External # 0107692 Crash ID 1786000		Page 01 of 02 File Class 53001																																																																																																																										
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Unit Number 02	Unit Known Yes	State MI	Driver License Number #####	Date of Birth (Age) ###/###/#### (21)	License Type <input type="radio"/> Operator <input type="radio"/> Chauffeur <input type="radio"/> Moped	Endorsements <input type="radio"/> Cycle <input type="radio"/> Farm <input type="radio"/> Recreation	Sex M	Total Occupants 00	Hazardous Action None
Unit Type P	Driver Information ##### IMLAY CITY, MI 48444 (###) ###-####				Driver is Owner No	Injury A	Position Pedestrian	Restraint No Belts Available	
Driver Condition at Time of Crash 1st Unknown				2nd Activity Outside Vehicle		Ejected	Trapped	Airbag Deployed Not Equipped	
Hospital MUNSON MEDICAL CENTER					Ambulance NONE				
Alcohol Suspected No	Contributing Factor No	Alcohol Test Type <input type="radio"/> Breath <input type="radio"/> Blood <input type="radio"/> Urine <input type="radio"/> Field <input type="radio"/> PBT <input type="radio"/> Refused <input checked="" type="radio"/> Not Offered			Alcohol Test Results <input type="radio"/> Pending	Test Results:	Interlock Device No		
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Vehicle Registration	State	Vehicle Description	Year	Make	Model	Color			
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					Injury	Ejected	Trapped	Airbag Deployed	
Hospital					Ambulance				
Carrier Information					USDOT	MC	MPSC		
Driver's CDL Type					Endorsements <input type="radio"/> H <input type="radio"/> P <input type="radio"/> T <input type="radio"/> N <input type="radio"/> S <input type="radio"/> X	CDL Exempt <input type="radio"/> Farm <input type="radio"/> Other			
GVWR/GCWR <input type="radio"/> 10,000 lbs. or Less <input type="radio"/> 10,001 - 26,000 lbs. <input type="radio"/> Greater than 26,000 lbs.			Vehicle Configuration		Cargo Body Type	Medical Card	Hazardous Material <input type="radio"/> Placard <input type="radio"/> Cargo Spill		ID # Class #
Owner Information					Owner Information				
Witness Information ##### #####					Witness Information ##### #####				
Investigated at Scene Yes	Reported Date (Time) 08/06/2019 (21:39)	1st Investigator Name (Iadgo) MELISSA AGUEROS			2nd Investigator Name (Iadgo)			Photos Yes	
Narrative Unit 1 was travelling w/b on M115 and swerved onto the shoulder of the roadway striking a construction worker (Unit 2) and the maintenance vehicle. The driver of unit 1 advised he was texting on his cell phone at the time of the crash. Unit 2's amber overhead light was activated at the time of the crash. Report to be sent to PAO for charges after complete investigation.					Diagram 				

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